(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 761 261 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
12.03.1997 Bulletin 1997/11

(51) Int. Cl.[6]: **A63C 9/08**

(21) Application number: **96112203.3**

(22) Date of filing: **29.07.1996**

(84) Designated Contracting States:
AT CH DE FR IT LI

(30) Priority: **08.08.1995 IT TV950100**

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(54) Snowboard binding with angular adjustment

(57) A snowboard binding with angular adjustment having a disk (3) rigidly connected to a snowboard, and a supporting base (5) for a shoe. A pawl (7) is associated with the base and selectively interacts, in contrast with a spring, with holes (12) formed on the disk. The pawl can be activated directly by the user and give a high degree of safety to the binding, keeping the selected angular position fixed even in the presence of snow or water and in case of violent impacts of the snowboard against the snow.

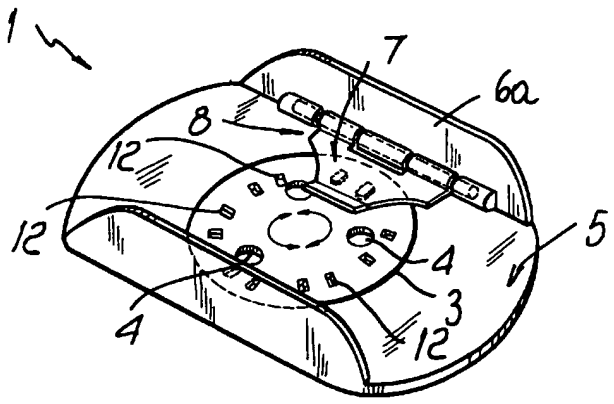

Fig. 1

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Description

The present invention relates to a snowboard binding with angular adjustment.

Snowboarding is characterized by various techniques that can be used by the sportsman, including jumps and various stunts, slalom, and speed. Of course, to correctly perform each one of these techniques, the user must assume a body posture that has a given angle with respect to the longitudinal axis of the board.

US-5,028,068 discloses a device, for selectively and pivotally positioning a ski binding on a snowboard, comprising a first plate that supports the boot and is arranged above a second circular plate that is perimetrically provided with a groove.

The second circular plate is rotatably connected to a third plate that is in turn rigidly connected to the board.

At the groove, the second circular plate has a cord that surrounds it and can be tensioned by means of a lever.

The actuation of the lever allows the engagement and/or disengagement of the cord with respect to the second circular plate, thus allowing the user to vary the angular position of the binding with respect to the longitudinal axis of the board.

This solution, however, has drawbacks: during the practice of slalom, jumps and stunts, the binding and therefore the board are subjected to a very large number of torsional stresses that may not be contrasted effectively by the tension of the cord on the second circular plate. In particular, at the moment of impact with the snow after a jump, the binding is subjected to a sudden and very intense torsional stress that can hardly be contrasted by the friction that occurs between the two smooth surfaces of the first plate and of the second plate.

Furthermore, the lever for tensioning the cord is distant and spaced from the binding. This lever can therefore easily disengage for example because of accidental impacts against rocks or other objects or because of the snow.

A portion of the cord is also exposed to possible accidental impacts, and the cord can be torn or be weakened, thus hindering the operation of the binding.

In such cases, the user would lose control of the board, which would be difficult to steer. Furthermore, snow or water can deposit between the cord and the second circular plate, further reducing the friction between the two smooth surfaces of the first plate and of the second plate and accordingly the overall locking force of the lever.

All this is to the detriment of the user, who due to the possible lack of rigid coupling of the binding to the board, may suffer severe problems involving the legs in case of a fall.

US-5,044,654 discloses a binding that can be rotated about its own vertical axis. Six spaced holes are formed thereon to accommodate a corresponding number of screws that are adapted to fix it to the board in a desired angular position that is preset by the user. The angular position can be changed by unscrewing the screws and repositioning them so that the binding is rotated by the desired angle.

Said binding also includes a safety for the quick release of the boot from the board that is composed essentially of a hub on which shaped seats are provided perimetrically to accommodate a ball, said accommodation being forced by means of a spring.

However, this solution has drawbacks: in order to vary the angular position of the binding with respect to the snowboard, the user must remove his foot from the binding, and by means of an appropriate tool, unscrew the fixing screws, reposition the binding in the desired position, and perform a new coupling of the binding to the board.

The above-described operations require considerable time, forcing the user to always have at least one tool available.

Furthermore, due to the limited care paid by the user to these operations owing to his eagerness to be on the slopes, imprecise fixing of the screws to the board may be achieved, with consequent dangers of separations or of poor control of the board during sports practice.

It is also known to use a snowboard binding that is fixed to the board by means of a disk that is rigidly connected to the board by means of screws.

Inclined planes protrude below said disk, toward the board, and are arranged perimetrically; they interact with appropriate complementarily shaped planes that are formed at an adapted seat for containing the disk that is formed on the binding.

By tightening the screws, the disk moves toward the board until its inclined planes interact with the complementarily shaped planes formed on the binding, thus locking the disk and the binding to the board in a desired position.

It is known to replace the inclined planes with pairs of sets of teeth that are also inclined and are arranged on the disk and on the binding.

In this manner, the engagement and disengagement of the screws allow the disk to rise until the sets of teeth are mutually disengaged, although the disk remains connected to the board.

By rising, the disk allows to turn the binding, which can be arranged in the desired angular position.

It is thus possible to obtain a range of different positions whose number is limited, however, by the size of the teeth that constitute the pairs of sets of teeth.

The use of this conventional binding, however, has other drawbacks; the user must remove his gloves, remove his foot from the binding, be equipped with a screwdriver or with an adapted wrench to disengage the screws, turn the binding with his hands into the position that is proximate to the desired one, and tighten the whole assembly.

This operation is excessively long and troublesome

to perform directly on the slope in order to modify the angular position according to the specific requirements.

A further solution that is used is known as "baseless", and includes a binding that is constituted by two separate half-shells that are mutually connected by a rear strap; each half-shell is fixed to the board by means of screws that are accommodated in adapted slots formed on the flat part of said half-shells.

This conventional binding has the drawback that its angular adjustment is limited by the dimensions of the slots.

The aim of the present invention is therefore to eliminate the drawbacks described above in conventional types by providing a device that allows to achieve a desired angular adjustment of the binding, with respect to the longitudinal axis of the board; said adjustment being stable during sports practice, thus increasing the degree of safety for the user.

Within the scope of the above aim, an object is to provide a device in which the preset adjustment of the angle cannot be modified by the possible presence of snow or water.

Another object is to provide a device that allows the user to achieve said desired adjustment very easily and quickly, without the user having to have particular tools available.

Another object is to provide an invention that is structurally compact and is not subjected to accidental opening during sports practice.

Another object is to provide a device that allows the user to modify the angular adjustment of the binding with respect to the board while keeping the boot associated with the binding and therefore even during sports practice.

Another object is to provide a device that ensures that the locking of the binding to the board during adjustment of the angle is maintained, increasing safety for the user.

Another object is to provide a device whose bulk and weight are negligible for the user during use of the board.

Another object is to provide a device that is reliable and safe in use and can be produced with reduced costs by means of conventional machines.

This aim, these objects, and others which will become apparent hereinafter are achieved by a snowboard binding with angular adjustment, comprising a disk rigidly connected to a snowboard and a supporting base for a shoe, characterized in that it comprises engagement means associated with said base and selectively interacting with grip means formed on said disk.

Conveniently, said engagement means interact with said grip means in contrast with at least one flexible element.

Further characteristics and advantages of the invention will become apparent from the detailed description of some particular embodiments, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

fig. 1 is a perspective view of a first embodiment of the binding;
fig. 2 is a detail top view of the engagement and grip means;
fig. 3 is a sectional view, taken along the plane III-III of fig. 2;
fig. 4 is a partially sectional side view of the snowboard, of the disk, and of the base;
fig. 5 is a view, similar to fig. 1, of a further embodiment;
fig. 6 is a sectional view, taken along the plane VI-VI of fig. 5;
fig. 7 is a sectional view, taken along the plane VII-VII of fig. 5;
fig. 8 is a detail view of the arrangement of the flexible element of the embodiment of fig. 5;
fig. 9 is a view, similar to fig. 1, of still a further embodiment;
fig. 10 is a view of a detail of fig. 9;
fig. 11 is a view, similar to fig. 1, of still a further embodiment;
fig. 12 is a top view of a detail of fig. 11;
fig. 13 is a view, similar to fig. 1, of still a further embodiment;
fig. 14 is a top view of a detail of fig. 13;
fig. 15 is a view, similar to fig. 1, of still a further embodiment;
fig. 16 is a view, similar to fig. 1, of still a further embodiment;
fig. 17 is a top view of a detail of fig. 16;
fig. 18 is a view of a detail of fig. 16;
fig. 19 is a view, similar to fig. 1, of still a further embodiment;
fig. 20 is a top view of a detail of the toothed sector of the disk of fig. 19;
fig. 21 is a sectional view, taken along the plane XXI-XXI of fig. 19;
fig. 22 is a sectional view, taken along the plane XXII-XXII of fig. 21;
fig. 23 is a view, similar to fig. 1, of still a further embodiment;
fig. 24 is a partially sectional front view of the binding of fig. 23, taken at the engagement and grip means;
fig. 25 is a lateral perspective view of a detail of fig. 23;
fig. 26 is a sectional view, taken along the plane XXVI-XXVI of fig. 24;
fig. 27 is a view, similar to fig. 1, of still a further embodiment;
fig. 28 is a partially sectional front view of the binding of fig. 27, taken at the engagement and grip means;
fig. 29 is a sectional view, taken along the plane XXIX-XXIX of fig. 28;
figs. 30 and 31 are detail views of the shape of some teeth of the binding;

fig. 32 is a view, similar to fig. 1, of an element for visualizing the angular position of the base with respect to the disk.

With reference to the above figures, the reference numeral 1 designates an angular adjustment device, particularly for a snowboard binding 2 that comprises a disk 3, which is rigidly connected to the snowboard by means of screws that pass through adapted first holes 4, and a base 5 for supporting a shoe that is not shown.

Base 5 is rotatably associated with disk 3 in a conventional manner and can also perform limited vertical movements with respect to the disk by means of adapted inclined planes, which are per se known and not shown, and protrude from the mutually facing surfaces of the base and of the disk.

Two shoulders 6a and 6b protrude from the substantially rectangular base 5 along the longitudinal sides and on the opposite face with respect to the snowboard.

The device comprises engagement means, associated with the base, that are constituted by a pawl 7 that has a first end 8 that is pivoted, by means of a pivot 9, internally and longitudinally to base 5 adjacent to shoulder 6a.

Pawl 7 has one or more teeth 11, at the second end 10, which can be arranged above said disk 3. Teeth 11 can be selectively engaged at an equal number of grip means that are preferably constituted by a plurality of second holes 12 that are formed radially with respect to the disk.

Pawl 7 can rotate about pivot 9 in contrast with at least one flexible element. In this particular embodiment, the flexible element is constituted by two springs 13a and 13b that are arranged coaxially at the ends of pivot 9 and are adapted to force teeth 11 of pawl 7 at an equal number of second holes 12.

The use of the invention is therefore as follows: in order to adjust the angular position of the base with respect to the disk, the user must remove the boot from the binding and raise pawl 7 to therefore disengage teeth 11 from the corresponding second holes 12. Then the user rotates base 5 into the desired position, and releases pawl 7, positioning the teeth at other second holes.

It has thus been observed that the invention has achieved the intended aim and objects, a binding having been provided that allows to achieve a desired angular adjustment, with respect to the longitudinal axis of the board, that is stable during sports practice, thus increasing the safety of the user, said adjustment being easy to set and modify by the user even in the presence of snow or water.

This adjustment can be achieved very easily and quickly by the user without requiring him/her to have particular tools available, and the binding has a small bulk and weight and is compact.

The binding according to the invention is of course susceptible of numerous modifications and variations, all of which are within the scope of the same inventive concept.

Thus, for example, figs. 5 to 8 illustrate a binding 101 with angular adjustment device that comprises a disk 103, which is rigidly connected to a snowboard, and a base 105 that is rotatably connected to the disk.

Two shoulders 106a and 106b protrude from the essentially rectangular base 105 along the longitudinal sides and on the opposite face with respect to the snowboard.

The device comprises engagement means that are associated with base 105 and are constituted by two pawls 107a and 107b that have a first end 108a and 108b that is pivoted by means of pivots 109a and 109b arranged internally and transversely to base 105 between shoulders 106a and 106b.

Pawls 107a and 107b have teeth 111, at the second end 110a and 110b that can be arranged above disk 103. Teeth 111 can be selectively engaged at a complementarily shaped set of teeth 112 that is formed in an upward region of, and radially to, disk 103 at the edge 114.

Pawl 107 can rotate about pivots 109 in contrast with at least one flexible element. In this particular embodiment, the flexible element is constituted by two springs 113 that are arranged coaxially to pivots 109 and are adapted to force teeth 111 of pawls 107a and 107b at the desired region of the complementarily shaped set of teeth 112.

Figs. 9 to 11 illustrate a further embodiment of a binding 201 with angular adjustment that comprises a disk 203 and a base 205 that is rotatably associated therewith.

Two shoulders 206a and 206b protrude from the essentially rectangular base 205 along the longitudinal sides and on the opposite face with respect to the snowboard.

The device comprises engagement means, associated with the base, that are constituted by a pawl 207 which, proximate to a first end 208, is pivoted by means of a pivot 209 above base 205 in the interspace between the pair of shoulders 206a and 206b.

Pawl 207 is arranged transversely to base 205 and has at least one rectangular or trapezoidal tooth 211 at its first end 208. Tooth 211 can be selectively engaged at a set of teeth 216 that is formed radially with respect to disk 203.

Pawl 207 has a second end 210 that protrudes externally with respect to shoulder 206a through an adapted slot 215 formed longitudinally in the shoulder. A grip tab 218 for the user is associated with second end 210 and protrudes on the opposite side with respect to the snowboard.

Pawl 207 can rotate about pivot 209 in contrast with at least one flexible element. In this particular embodiment, the flexible element is constituted by a spring 217 that is arranged laterally adjacent to shoulder 206a and is connected, at its ends, to pawl 207 and to a pin 219 that protrudes at right angles to base 205. The spring forces tooth 211 of the pawl into the set of teeth 216.

In this case, too, it is therefore very easy for the user to vary the angle of base 205 with respect to disk 203, while the shoe is associated with the binding, simply by forcing, with one finger, the rotation of pawl 207 until tooth 211 disengages from the set of teeth 216 and releasing the pawl once the desired angle of base 205 has been reached.

Figs. 11 and 12 illustrate a further embodiment of a binding 301 with angular adjustment that comprises a disk 303 and a base 305 that is rotatably associated therewith.

Two shoulders 306a and 306b protrude from the essentially rectangular base 305 along the longitudinal sides and on the opposite face with respect to the snowboard.

The device comprises engagement means, associated with the base, that are constituted by two pawls 307a and 307b that are arranged essentially longitudinally to base 305, proximate to the longitudinal edges thereof that are adjacent to the pair of shoulders 306a and 306b.

Pawls 307a and 307b also have a second end 310 that is pivoted to the underlying base 305 by means of an adapted pivot 309.

Each pawl 307a and 307b has a first end 308 that has at least one region that faces the edge 314 of disk 303 and is shaped complementarily thereto. Teeth 311 are formed at said region and are shaped complementarily with respect to a set of teeth 316 that is formed at edge 314.

On the opposite side with respect to teeth 311, each pawl 307a and 307b has a tab, designated by the reference numerals 318a and 318b, that protrudes externally with respect to the two shoulders 306a and 306b through adapted slots 315a and 315b.

Tabs 318a and 318b are essentially L-shaped, and one of their wings lies approximately parallel to the two shoulders 306a and 306b so as to allow the user to grip it.

Pawls 307a and 307b are forced to interact with disk 303 by means of adapted flexible elements, such as two springs 313 that are interposed respectively between shoulders 306a and 306b and a region of pawls 307a, 307b that is intermediate between the first end and the second end.

In this case, too, the user can vary the angular position of base 305 with respect to disk 303, keeping the shoe associated with the binding and simply shifting outwards tabs 318a and 318b of pawls 307a and 307b, so as to disengage teeth 311 from the set of teeth 316.

Figs. 13 and 14 illustrate a further embodiment of a binding 401 with angular adjustment that comprises a disk 403 and a base 405 that is rotatably associated therewith.

Two shoulders 406a and 406b protrude from the essentially rectangular base 405 along the longitudinal sides and on the opposite face with respect to the snowboard.

The device comprises engagement means that are associated with base 405 and are constituted by a pawl 407 which, proximate to a first end 408 located approximately at the median plane that lies longitudinally to the base 405, is pivoted to the base by means of an adapted pivot 409.

Pawl 407 has a substantially semicircular plan shape that is complementary to edge 414 of disk 403 that it faces.

A set of teeth 416 is also formed on edge 414 of disk 403 and selectively interacts with complementarily shaped teeth 411 that are formed on the facing surface of pawl 407. The pawl has a second end 410 that is connected to a rod 420 that is arranged transversely to base 405 and protrudes from shoulder 406b through an adapted hole formed on the shoulder.

Pawl 407 can rotate at pivot 409 in contrast with a flexible element that is constituted by a spring 413 that is associated, at its ends, with shoulder 406b and with a pin 419 that protrudes from the second end 410 of pawl 407 on the opposite side with respect to disk 403.

In this case, too, the user can change the angle of the base with respect to the disk, although the shoe is associated with the binding, since it is sufficient to push the end of rod 420 that protrudes from shoulder 406b to disengage teeth 411 of pawl 407 from the set of teeth 416 of disk 403.

Spring 413 then forces the repositioning of teeth 411 on the set of teeth 416.

Fig. 15 shows the device of figs. 13 and 14, in which the second end 510 of pawl 507 is again connected to a rod 520 that is arranged transversely to shoulders 506a and 506b and protrudes outside shoulder 506b, where rod 520 is connected to a lever 521 provided with an eccentric element.

The lever therefore allows to temporarily disengage from each other the teeth provided on edge 514 of disk 503 and the complementarily shaped set of teeth 516 formed on pawl 507.

Advantageously, at rod 520 it is possible to interpose an optional means for adjusting its length, this means being constituted, for example, by a sleeve 522 that is internally provided with complementarily threaded sets of teeth that interact with complementarily threaded ends of sleeve 520 that are associated thereat.

Figs. 16, 17, and 18 show a further embodiment of a binding 601 with angular adjustment that comprises a disk 603 and a base 605 that is rotatably associated therewith.

Two shoulders 606a and 606b protrude from the substantially rectangular base 506 along the longitudinal sides and on the opposite face with respect to the snowboard.

The device comprises engagement means, associated with base 605, which are constituted by a worm gear 607 that is arranged transversely to base 605. A first end 608 and the second end 610 of the worm gear are pivoted so that they can freely rotate at adapted through seats formed on the pair of shoulders 606a and

606b.

The stem of worm gear 607 interacts with a complementarily shaped set of teeth 616 that is formed at edge 614 of disk 603.

Worm gear 607 has a second end 610 that protrudes outside shoulder 606b, where a folding knob 623 that can be operated by the user is pivoted.

In this case, too, the user can therefore adjust the angle of base 605 with respect to disk 603, while the shoe is associated with the binding, simply by turning worm gear 607 in the appropriate direction.

Of course, the pitch of the worm gear or the inclination of its thread can be the most pertinent according to the specific requirements and therefore, for example, according to the need to increase precision or the presence of mutual movement between the worm gear and the disk.

Figs. 19, 20, 21, and 22 illustrate a further embodiment of a binding 701 with angular adjustment that comprises a disk 703 and a base 705 that is rotatably associated therewith.

Two shoulders 706a and 706b protrude from the substantially rectangular base 705 along the longitudinal sides and on the opposite face with respect to the snowboard.

Shoulder 706a has a flat shape, whereas shoulder 706b has a box-like shape.

The device comprises engagement means, associated with box-like shoulder 706b that is connected to base 705, which are constituted by a block 707 that can move vertically inside box-like shoulder 706b and is actuated by an adatped lever 721 that is provided with an eccentric element and is arranged outside box-like shoulder 706b at its upper surface 725.

Lever 721 is pivoted, at the eccentric element, to a shaft 724 that passes at an adapted hole formed on the upper surface 725 and is connected, at its other end, to the underlying block 707.

A flexible element, such as a spring 713 interposed between the block and the facing wall of box-like shoulder 706b, is arranged coaxially to shaft 724.

The diameter of disk 703 is greater than the width of base 705, and adapted slots or openings 715 are formed at shoulders 706a and 706b and allow, on one side, the protrusion of disk 703 and, on the other side, to arrange the disk inside box-like shoulder 706b.

Block 707 has teeth 711, at the surface that faces the disk. Teeth 711 interact at a complementarily shaped set of teeth 716 that is formed proximate to the edge 714 of disk 703.

By acting on lever 721, it is therefore possible to move block 707, disengaging its teeth 711 from the complementarily shaped set of teeth 716 so as to allow base 705 to rotate with respect to disk 703.

The closure of lever 721 makes teeth 711 interact again with the complementarily shaped set of teeth 716, locking the angular mutual position of the base and of the disk.

Advantageously, disk 703 has a plurality of graduated notches 726, opposite to its region that interacts with the block 707. Notches 726 allow the user to check the selected angle between base 705 and the median longitudinal axis of the snowboard.

Figs. 23, 24, 25, and 26 illustrate a further embodiment of a binding 801 with angular adjustment that comprises a disk 803 and a base 805 that is rotatably associated therewith.

Two shoulders 806a and 806b protrude from the substantially rectangular base 805 along the longitudinal sides and on the opposite face with respect to the snowboard. Shoulder 806b has a box-like shape.

The device comprises engagement means that are associated at box-like shoulder 806b and are constituted by a block 807 that can slide vertically inside box-like shoulder 806b and protrudes above it at an adapted opening formed on the upper surface 825.

The diameter of disk 803 is greater than the width of base 805, and the disk affects adapted slots or openings 815 that are formed or provided at shoulders 806a and 806b.

Block 807 thus faces a region of the underlying disk 803 where the block has a plurality of teeth 811 that interact at a complementarily shaped set of teeth 816 formed proximate to the edge 814 of disk 803.

The vertical movement of block 807 can be achieved selectively by means of an adapted activation element, which is constituted by a first button 827 and by a second button 828 that are arranged parallel to each other and transversely to the outer lateral surface 829 of box-like shoulder 806.

The first and second buttons can move along their plane of arrangement and are mutually connected by two cranks 830a and 830b that are pivoted in a median region to two supports 831a and 831b that protrude inside the outer lateral surface 829 of box-like shoulder 826b toward block 807.

First button 827 can move in contrast with at least one flexible element, such as a spring 813 that is interposed between the inside of the outer lateral surface 829 of box-like shoulder 826b and the transverse end of first button 827 that does not face block 807.

A transverse seat 832 is formed in the block, at first button 827, to temporarily accommodate the first button.

Transverse seat 832 is formed at such a level that if it is affected by first button 827 and forces the interaction between teeth 811 and the complementary set of teeth 816, so as to lock the angular mutual arrangement of base 805 and of disk 803.

Block 807 is forced to disengage from the complementarily shaped set of teeth 816 of disk 803 by adapted second springs 833a and 833b that are interposed between two tabs 818a and 818b, which protrude laterally to block 807, and the underlying lower surface of box-like shoulder 806b or the surface of disk 803.

Pressure applied by the user at second button 828 actuates the extraction of first button 827 from seat 832, thus releasing block 807, which is forced to rise by second springs 833a and 833b, so as to disengage teeth

811 from the complementary set of teeth 816.

Once the desired angular position of base 805 with respect to disk 803 has been achieved, it is sufficient for the user to press block 807 until spring 803 pushes first button 827 into transverse seat 832 once they are arranged at the same plane.

Figs. 27, 28, 29, 30, 31, and 32 illustrate a binding 901 with angular adjustment that comprises a disk 903 that is rigidly connected to the snowboard and a base 905 that is rotatably connected thereto.

Two shoulders 906a and 906b protrude from the substantially rectangular base 905 along the longitudinal sides and on the opposite face with respect to the snowboard. Shoulder 906a has a box-like shape.

The diameter of disk 903 is greater than the width between the pair of shoulders 906a and 906b, and the disk has parts that protrude from the shoulders through adapted slots or openings 915.

Graduated notches 926 are provided on the portion of disk 903 that protrudes beyond shoulder 906a to allow the user to visualize the rotation angle of base 905 with respect to disk 903.

The device comprises engagement means, associated with box-like shoulder 906b which is rigidly coupled to base 905, and is constituted by a block 907 that can move vertically inside box-like shoulder 906b. The lower end of block 907 can be located at the plane of arrangement of the underlying disk 903.

The vertical movement of block 907 occurs in contrast with flexible elements such as two springs 913a and 913b that are interposed between adapted abutments 934a and 934b that are formed laterally to block 907 and the underlying inner lower wall of box-like shoulder 906b.

Block 907 has a plurality of teeth 911, at the second end 910 that is directed toward the snowboard and at the lateral surface that faces the edge 914 of the disk 903. Upon a vertical movement of block 907, teeth 911 enter at the adapted interspaces formed on a set of teeth 916 on the edge 914 of disk 903.

Teeth 911 and set of teeth 914 advantageously have an asymmetrical triangular profile. In fig. 31, only one of teeth 911 has been shown for the sake of clarity and shows that it is substantially constituted by a prism having a triangular base in which the top triangular face 935 is larger than the bottom triangular face 936. Side walls 937 that join the faces are therefore inclined so as to give each tooth a substantially flared shape.

This particular configuration facilitates the insertion from above of a tooth 911 at the underlying set of teeth 916 and allows to recover any plays due to wear or imprecision in machining. It is therefore not necessary to provide highly precise machining tolerances to ensure the mutual locking of block 907 and disk 903.

The coupling between the teeth and the set of teeth improves the locking of the base on the disk, whereas the vertical component of the forces that act on the teeth has a very small value.

Since the force that is the cause of the tendency of the teeth to disengage with respect to the set of teeth is very low, the safety in the mutual locking of the two components is increased, to the full advantage of the user.

A transverse seat 932 is formed at block 907, and the user can insert his/her fingers or any other object therein, lifting block 907 upwards and thus elongating springs 913a and 913b.

In this manner, teeth 911 are disengaged from the set of teeth 916, freeing the rotation of base 905 with respect to disk 903, although the boot remains inserted in the binding.

Once the angular position of base 905 has been changed, it is sufficient to release block 907, which is forced by springs 913a and 913b so as to reengage teeth 911 with the set of teeth 916.

Fig. 32 illustrates an embodiment wherein graduated notches 1026 have been provided on disk 1003, which protrudes outside base 1005 beyond two shoulders 1006a and 1006b, and in which there is a reference notch 1038 at one of the shoulders to facilitate the user in determining the angle set between base 1005 and disk 1003.

The materials and the dimensions that constitute the individual components of the device may of course be the most appropriate according to the specific requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A snowboard binding with angular adjustment, comprising a disk (3,103,203,303,403,503,603, 703,803,903,1003) rigidly connected to a snowboard and a supporting base (5,105,205, 305,405,505,605,705,805,905,1005) for a shoe, characterized in that it comprises engagement means (7,107,207,307,407,507,607,707,807,907, 1007) associated with said base and selectively interacting with grip means (12,112,212,312, 412,512,612,712,812,912,1012) formed on said disk.

2. The binding according to claim 1, characterized in that said engagement means interacts with said grip means in contrast with at least one flexible element (13,113,213,313,413,513,613,713,813,913).

3. The binding according to claim 2, wherein said base is rotatably associated with said disk and is vertically movable with respect to said disk by means of adapted inclined planes protruding from the mutually facing surfaces of said base and said disk, shoulders (6a,6b) protruding from said sub-

stantially rectangular base along the longitudinal sides and on the opposite face with respect to said snowboard; characterized in that said engagement means, associated with said base, is constituted by a pawl (7) having a first end (8) that is pivoted, by means of a pivot (9), internally and longitudinally with respect to said base adjacent to one of said shoulders.

4. The binding according to claim 3, characterized in that said pawl has teeth (11), at a second end (10) that can be positioned above said disk (3), said teeth being selectively engaged at an equal number of said grip means constituted by second holes (12) formed radially to said disk.

5. The binding according to claim 1, characterized in that said engagement means comprises two pawls (107a,107b) having a first end (108a,108b) that is pivoted, by means of a pivot (109a,109b) arranged internally and transversely to said base (105), between a pair of shoulders (106a,106b), said two pawls having teeeth (111), at a second end (110a,110b) that can be arranged above said disk (103), said teeth being selectively engaged at a complementarily shaped set of teeth formed in an upward region and radially with respect to said disk (103) at an edge (114) of said disk.

6. The binding according to claim 5, characterized in that said two pawls rotate about said pivots in contrast with a pair of springs (113) that are arranged coaxially to said pivots and are adapted to force said teeth (111) of said two pawls at the desired region of said complementarily shaped set of teeth (112).

7. The binding according to claim 1, characterized in that said engagement means comprises a pawl (207) which is pivoted, proximate to one end, by means of a pivot (209) above said base (205) in an interspace between two shoulders (206a,206b), said pawl being arranged transversely to said base and having at least one rectangular or trapezoidal tooth (211) that can be engaged selectively at a set of teeth (216) that is formed radially to said disk (203).

8. The binding according to claim 7, characterized in that said pawl has an end (210) that protrudes externally with respect to one of said shoulders through a slot (215) formed longitudinally on said shoulder, a grip tab (218) for the user being associated with said end of said pawl and protruding on the opposite side with respect to said snowboard.

9. The binding according to claim 8, characterized in that said pawl rotates about said pivot in contrast with at least one flexible element that is constituted by a spring (217) that is arranged laterally to one of said shoulders and is connected, at its ends, to said pawl and to a pin (219) that protrudes at right angles to said base, said spring forcing said tooth of said pawl into said set of teeth.

10. The binding according to claim 1, characterized in that said engagement means comprises two pawls (307a,307b) that are arranged substantially longitudinally to said base (305) proximate to longitudinal edges thereof that are adjacent to said two shoulders, said two pawls having a second end (310) pivoted to said base by means of a pivot (309).

11. The binding according to claim 10, characterized in that each one of said two pawls has a first end (308), having a region which faces an edge (314) of said disk (303) and shaped complementarily thereto, teeth (311) being formed at said region and being shaped complementarily to a set of teeth (316) formed at said edge (314).

12. The binding according to claim 11, characterized in that on the opposite side with respect to said teeth, each one of said two pawls has a tab (318a,318b) that protrudes outside said two shoulders through slots (315a,315b), said tabs being substantially L-shaped, and having a wing arranged approximately parallel to said two shoulders to allow the user to grip it.

13. The binding according to claim 12, characterized in that said two pawls are forced to interact with said disk by means of adapted flexible elements, such as two springs (313) that are interposed respectively between said two shoulders (306a,306b) and a region of said two pawls that is intermediate between first and second ends.

14. The binding according to claim 1, characterized in that said engagement means comprises a pawl (407) which, proximate to a first end (408) located approximately at the median plane that lies longitudinally to said base (405), is pivoted to said base by means of an adapted pivot (409), said pawl having a plan shape that is essentially circular and complementary to an edge (414) of said disk (403), which it faces.

15. The binding according to claim 14, characterized in that a set of teeth (416) is formed on said edge (414) of said disk (403) and selectively interacts with complementarily shaped teeth (411) that are formed on the facing surface of said pawl, which has a second end (410) which is connected to a rod (420) arranged transversely to said base and protrudes from one of said two shoulders through an adapted hole formed thereon.

16. The binding according to claim 15, characterized in that said pawl rotates at said pivot (409) in contrast with a flexible element that is constituted by a spring (413) that is associated, at a first end, with one of said two shoulders (406b) and with a pin (419) that protrudes from the second end of said pawl on the opposite side with respect to said disk.

17. The binding according to claim 14, characterized in that said second end (510) of said pawl is connected to a rod (520) that is arranged transversely to said two shoulders (506a,506b) and protrudes externally thereto, where said rod is connected to a lever (521) that is provided with an eccentric element, said lever allowing to temporarily disengage from each other said teeth of said edge (514) of said disk (503) and said complementarily shaped set of teeth formed on said pawl.

18. The binding according to claim 17, characterized in that a means for adjusting the length of said rod is interposed at said rod, said means being constituted by a sleeve (522) that is internally provided with complementarily threaded sets of teeth that interact with complementarily threaded ends of said sleeve that are associated thereat.

19. The binding according to claim 1, characterized in that said engagement means comprises a worm gear (607) that is arranged transversely to said base (605), the first (608) and second (610) ends of said worm gear being pivoted, so that they can rotate freely, at adapted through seats formed on two shoulders (606a,606b) of said base.

20. The binding according to claim 19, characterized in that the stem of said worm gear interacts with a complementarily shaped set of teeth (616) formed at said edge (614) of said disk (603), said worm gear having, at said second end that protrudes outside one of said two shoulders, a folding knob (623) that can be operated directly by the user.

21. The binding according to claim 1, characterized in that said base (705) has shoulders (706a,706b), at least one of said shoulders having a box-like shape, said engagement means associated with said box-like shoulder (706b) being constituted by a block (707) that can move vertically inside said box-like shoulder and can be actuated by an adapted lever (721) that is provided with an eccentric element and is arranged outside said box-like shoulder at its upper surface, said lever being pivoted, at said eccentric element, to a shaft (724) that passes at a hole formed on said upper surface (725) and is connected, at the other end, to said underlying block.

22. The binding according to claim 21, characterized in that a flexible element, such as a spring (713) interposed between said block and the facing wall of said box-like shoulder, is arranged coaxially to said shaft, said disk having a diameter that is greater than the width of said base, slots (715) being formed at said two shoulders and being adapted to allow the protrusion of said disk on one side and, on the other side, the positioning thereof inside said box-like shoulder.

23. The binding according to claim 22, characterized in that said block has teeth (711), at the surface that faces said disk, said teeth interacting at a complementarily shaped set of teeth (716) that is formed proximate to said edge (714) of said disk (703).

24. The binding according to claim 23, characterized in that said disk has notches (726), in the opposite part with respect to its region that interacts with said block (707), said notches (726) allowing the user to check the selected angle between said base and the median longitudinal axis of said snowboard, a reference notch being associated on the outside of one of said two shoulders and being adapted to facilitate the user in determining the angle set between said base and said disk.

25. The binding according to claim 1, characterized in that said engagement means is associated at a box-like shoulder (806b) of said base (805) and comprises a block (807) that can slide vertically inside said box-like shoulder and protrudes above it at an opening formed on an upper surface (825), said disk (803), which has a diameter that is greater than the width of said base (805), affecting adapted slots (815) provided at said two shoulders, said block facing a region of said underlying disk where said block has a plurality of teeth (811) that interact at a complementarily shaped set of teeth (816) formed proximate to an edge (814) of said disk (803).

26. The binding according to claim 25, characterized in that a vertical movement of said block can be achieved selectively by means of an activation element that is constituted by a first button (827) and by a second button (828) that are arranged parallel to each other and transversely to the outer lateral surface of said box-like shoulder (826b), said first and second buttons being able to move along their own plane of arrangement and being mutually connected by two cranks (830a,830b) that are pivoted in a median region to two supports that protrude inside the outer lateral surface of said box-like shoulder toward said block (807).

27. The binding according to claim 26, characterized in that said first button (827) can move in contrast with at least one flexible element, such as a spring (813) that is interposed between the inside of the outer

lateral surface of said box-like shoulder and the transverse end of said first button that does not face said block, a transverse seat (832) being formed in said block, at said first button, for the temporary accommodation of said first button.

28. The binding according to claim 27, characterized in that said transverse seat is formed at such a level as to force, if it is affected by said first button, the interaction between said teeth and said complementarily shaped set of teeth, so as to lock the mutual angular arrangement of said base and of said disk.

29. The binding according to claim 28, characterized in that said block is forced to disengage from said complementarily shaped set of teeth of said disk by second springs (833a,833b) interposed between two tabs (818a,818b) that protrude laterally to said block and said underlying lower surface of said box-like shoulder or of the surface of said disk, a pressing action applied by the user at said second button actuating the extraction of said first button from said seat, releasing said block, which is forced to rise by said second springs, mutually disengaging said teeth and said complementarily shaped set of teeth.

30. The binding according to claim 1, characterized in that said engagement means is associated with a box-like shoulder (906a) of said base, and comprises a block (907) that can move vertically inside said box-like shoulder and whose lower end can be arranged at the plane of arrangement of said underlying disk (903), the vertical movement of said block occurring in contrast with flexible elements such as a pair of springs (913a,913b) interposed between abutments (934a,934b) that are formed laterally to said block and the underlying lower inside wall of said box-like shoulder.

31. The binding according to claim 30, characterized in that said block has, at the second end that is directed toward the snowboard, and at a lateral surface that faces an edge of said disk, a plurality of teeth (911) which, upon a vertical movement of said block, enter at interspaces formed on a set of teeth (916) on said underlying and adjacent edge (914) of said disk (903).

32. The binding according to claim 31, characterized in that said teeth (911) and said set of teeth (916) have an asymmetrical triangular profile, each one of said teeth and/or of the components of said set of teeth being substantially constituted by a prism that has a triangular base (935), in which the top triangular face is smaller than the bottom triangular face (936), side walls (937) that join said top and bottom faces being tilted so as to give each tooth an essentially flared shape.

33. The binding according to claim 32, characterized in that a transverse seat (932) is formed at said block, the user being able to insert his fingers or any other object in said seat to lift said block upwards, with the consequent elongation of said springs to force the mutual disengagement of said teeth and said set of teeth.

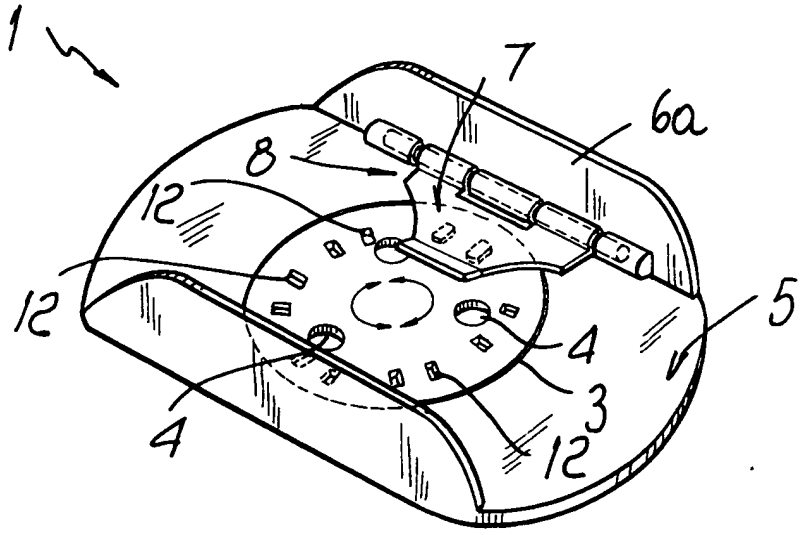

Fig. 1

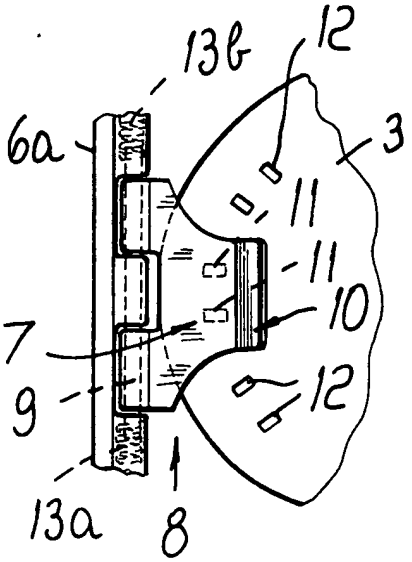

Fig. 2

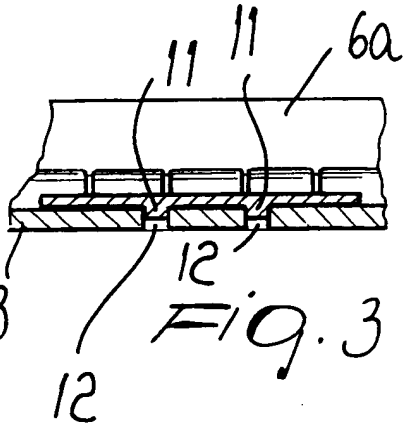

Fig. 3

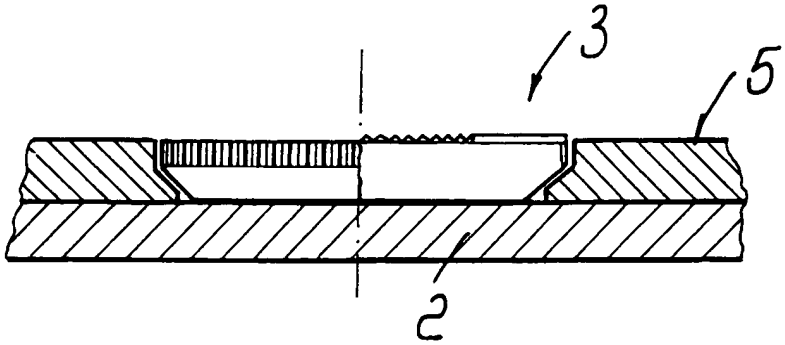

Fig. 4

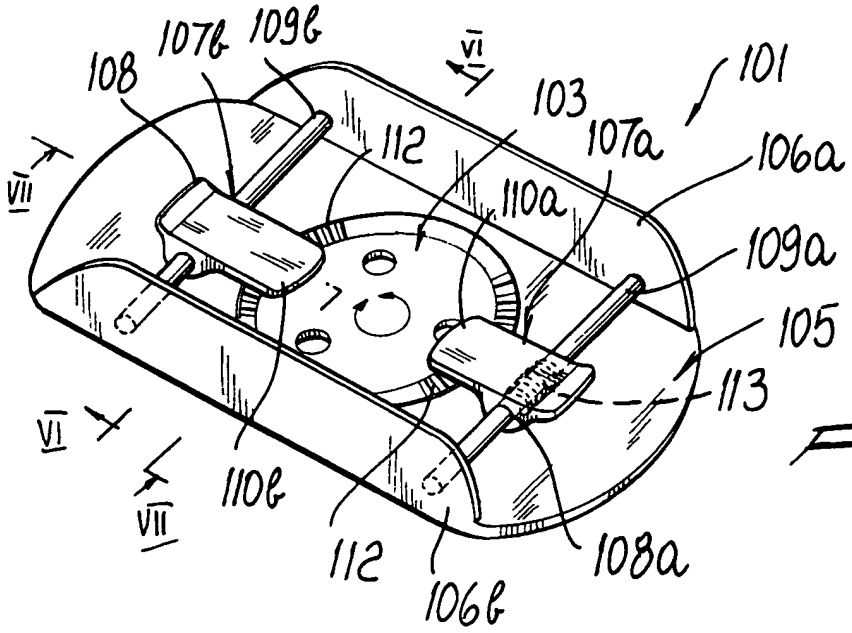

Fig. 5

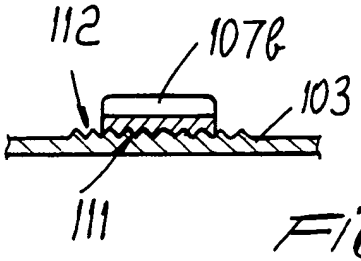

Fig. 6

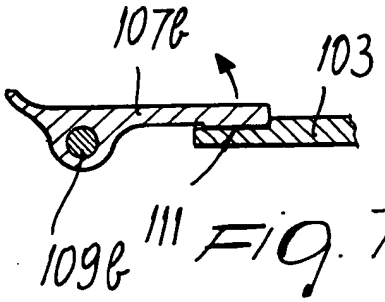

Fig. 7

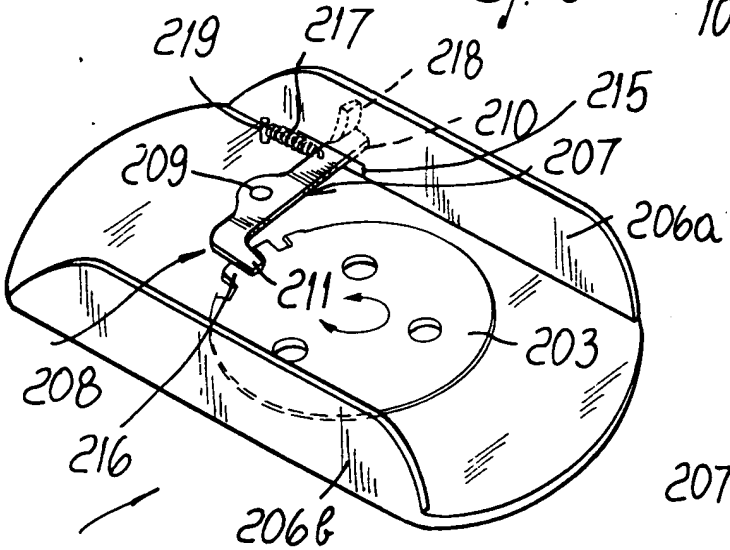

Fig. 9

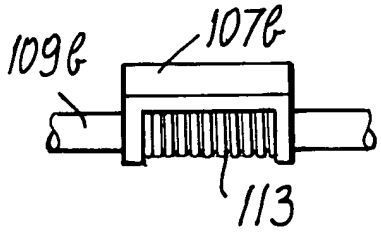

Fig. 8

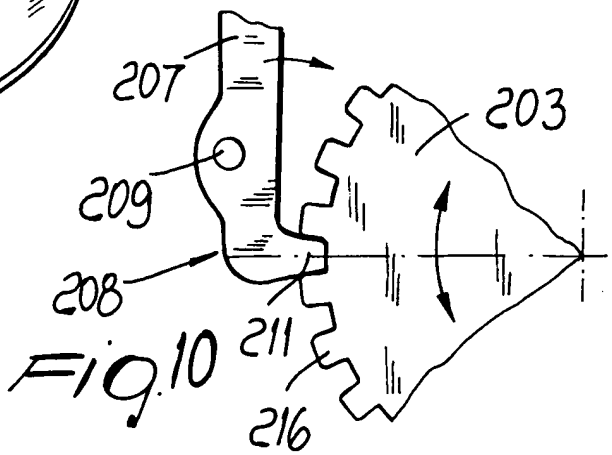

Fig. 10

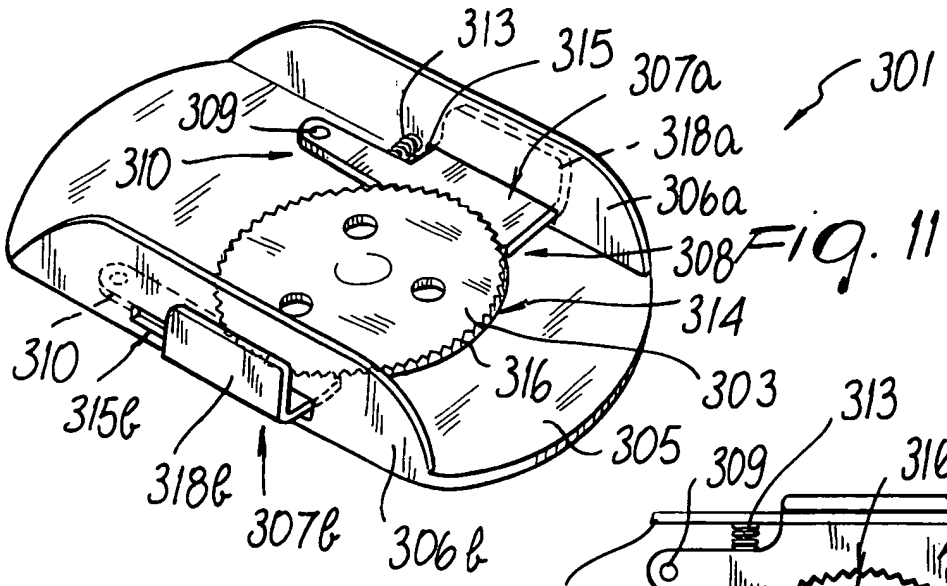

Fig. 11

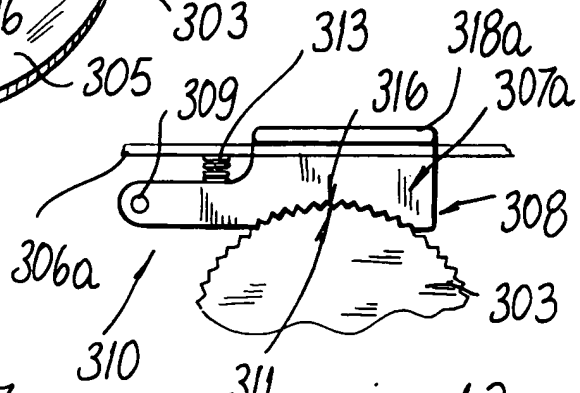

Fig. 12

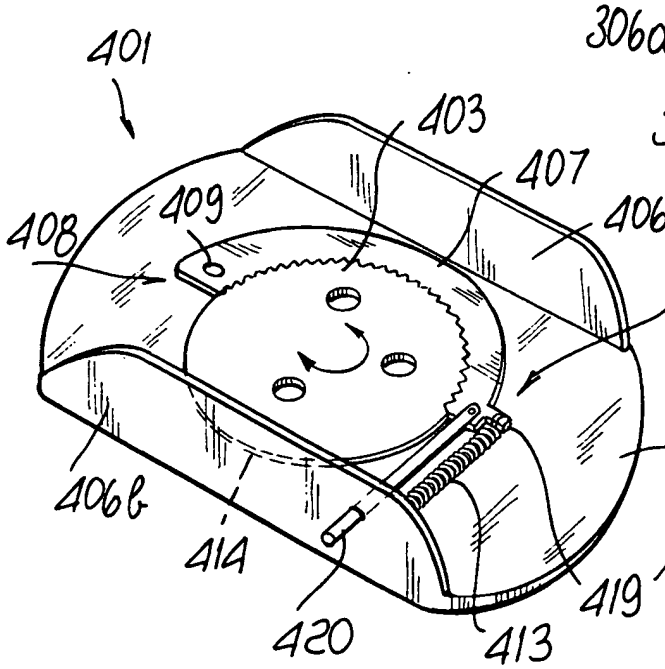

Fig. 13

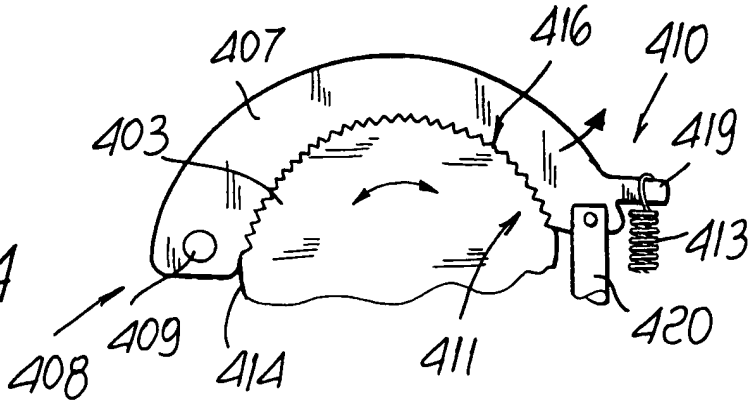

Fig. 14

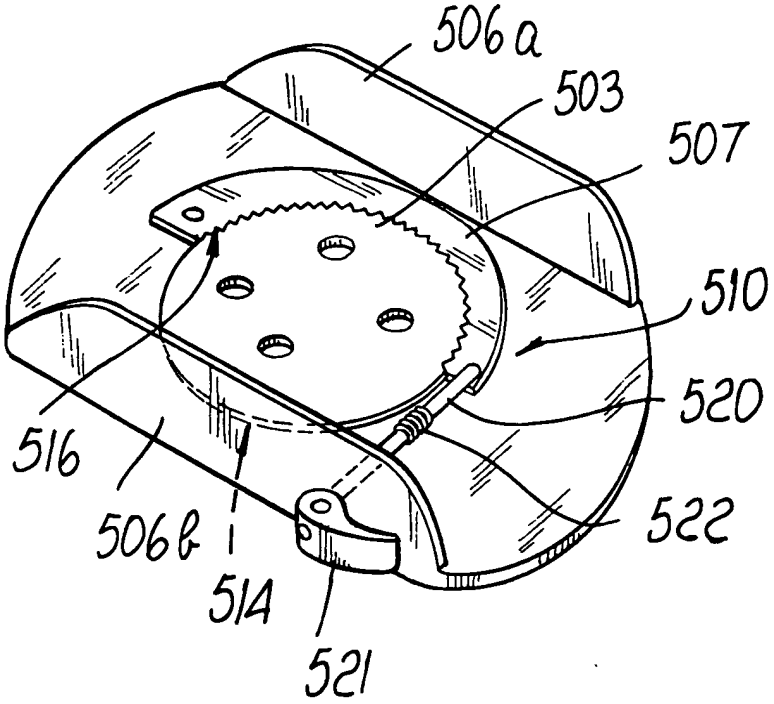

FIG. 15

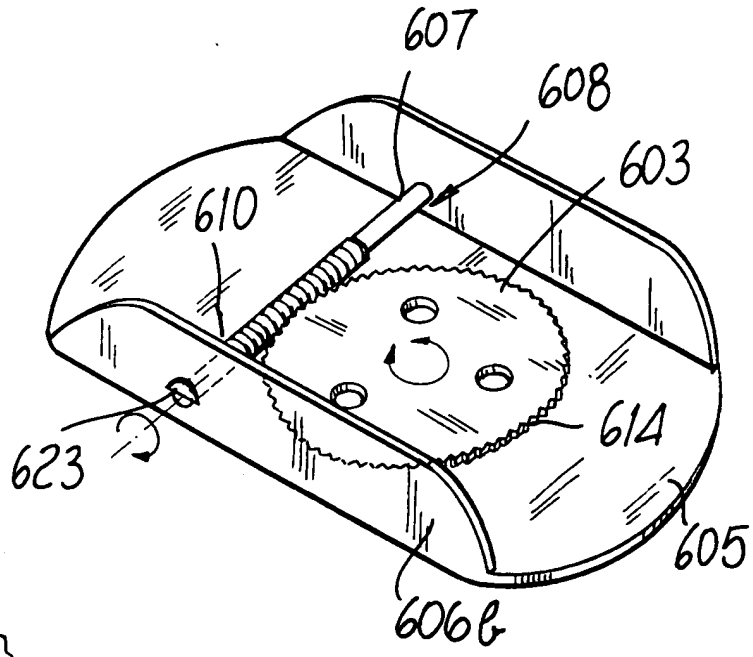

FIG. 16

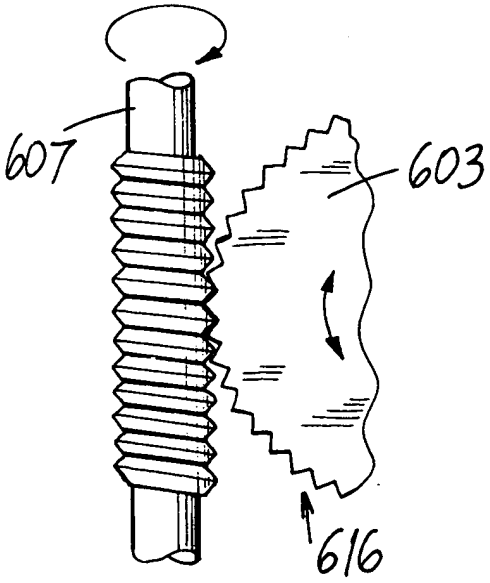

FIG. 17

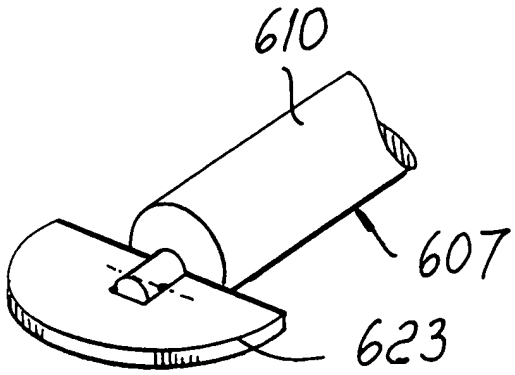

FIG. 18

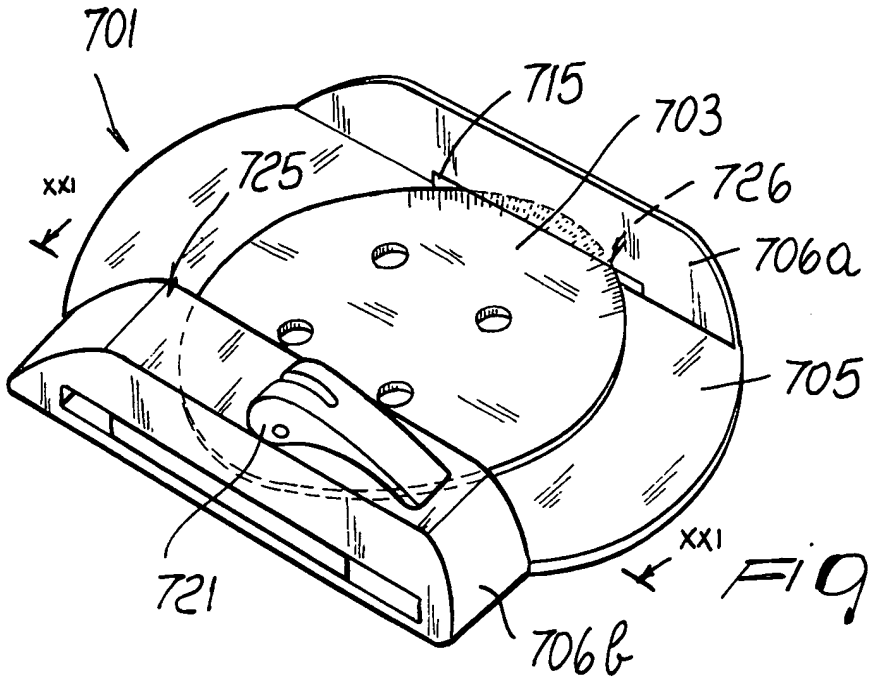

Fig. 19

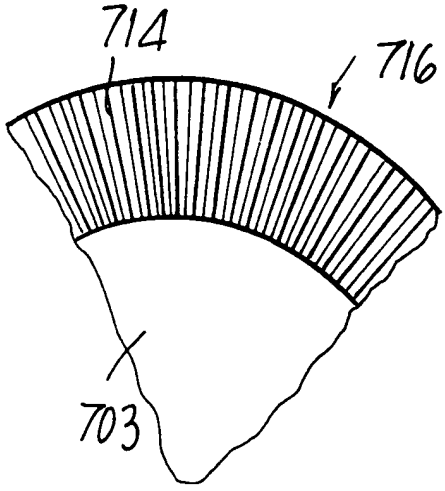

Fig. 20

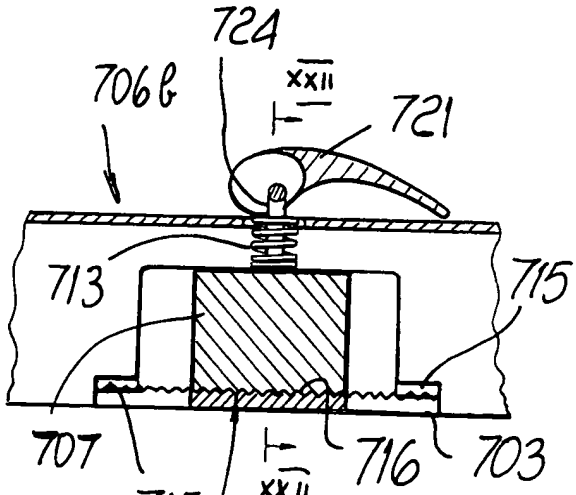

Fig. 21

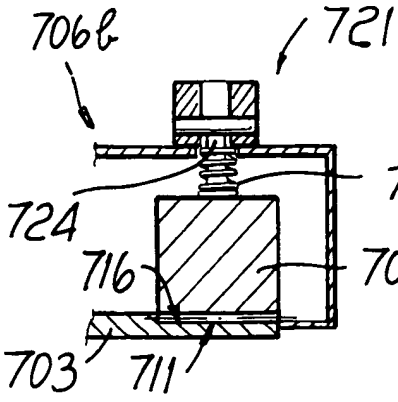

Fig. 22

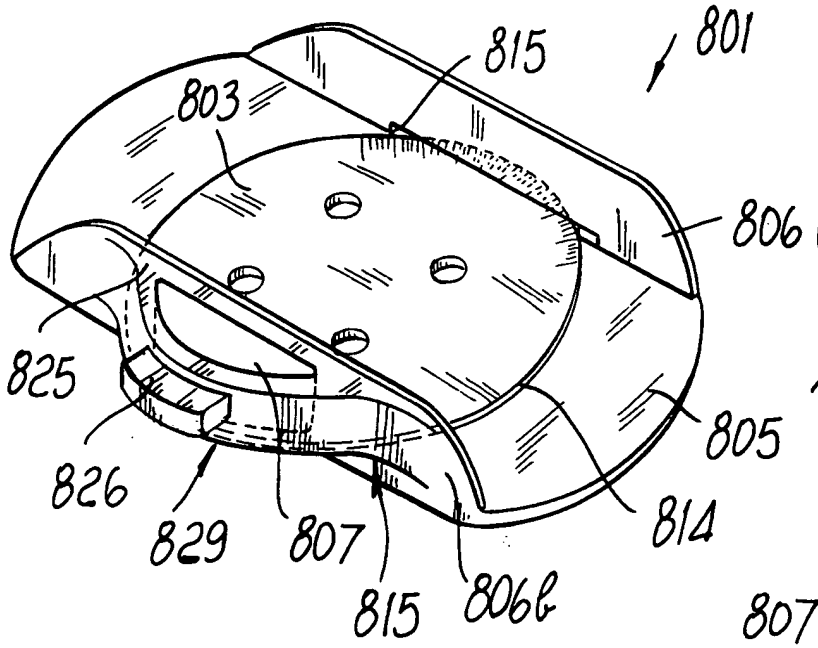

Fig. 23

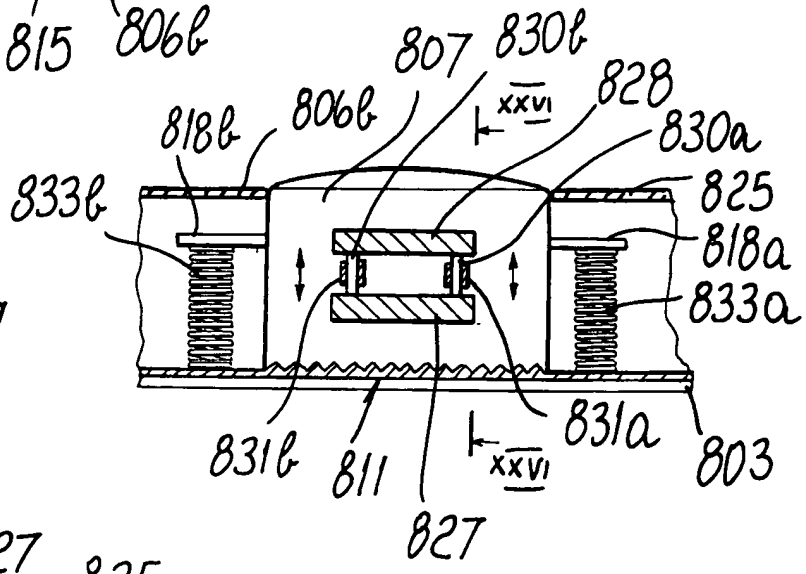

Fig. 24

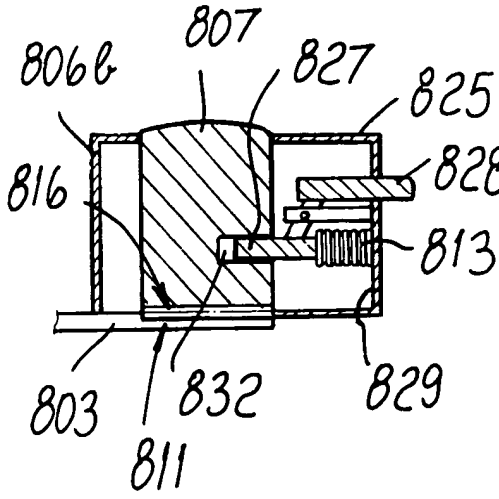

Fig. 25

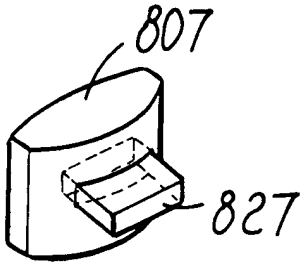

Fig. 26

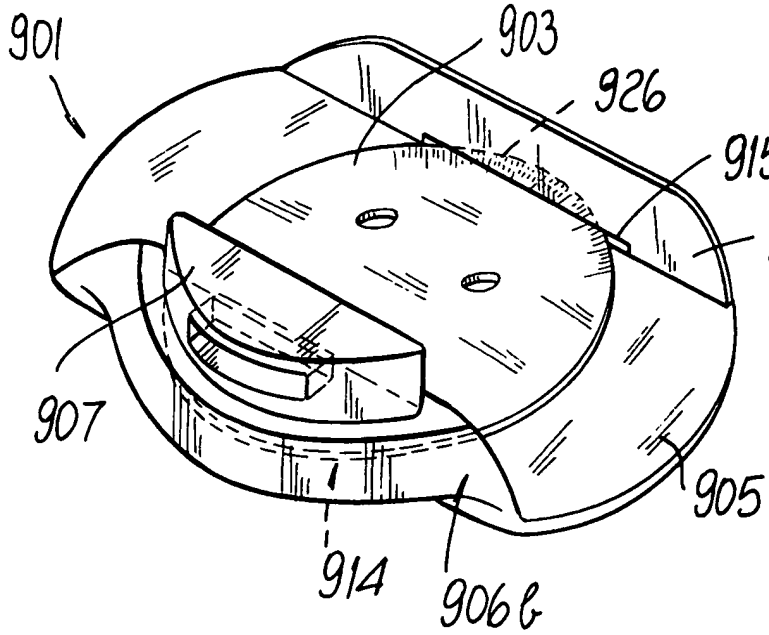

FIG. 27

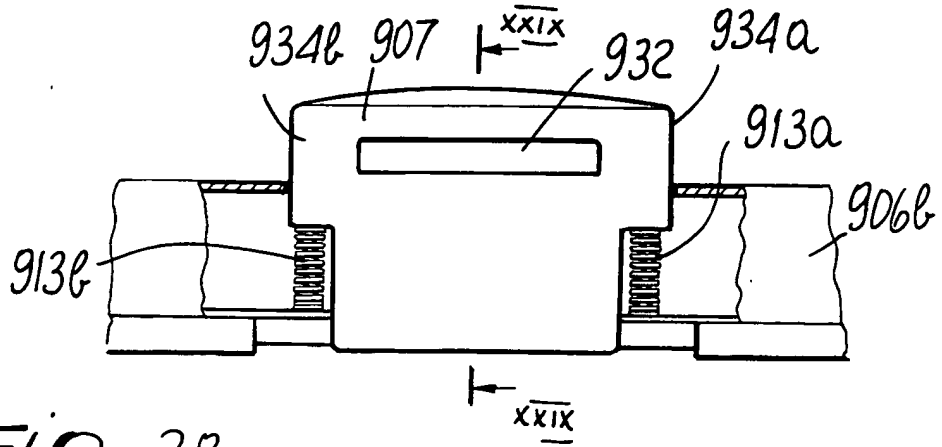

FIG. 28

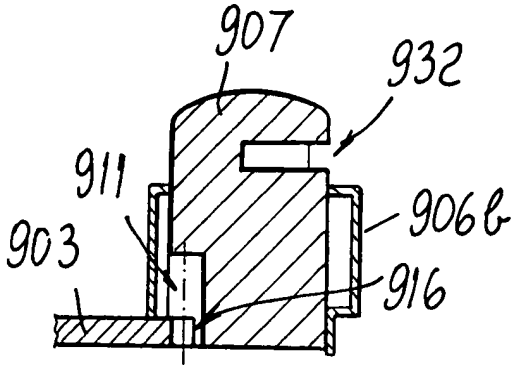

FIG. 29

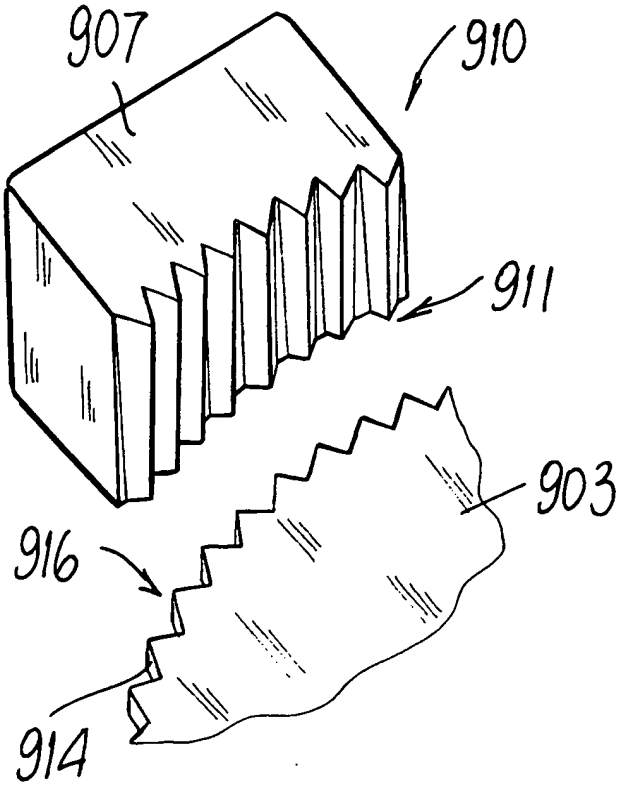

Fig. 30

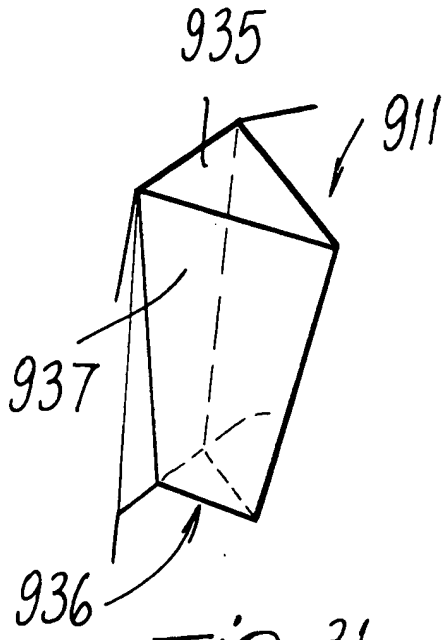

Fig. 31

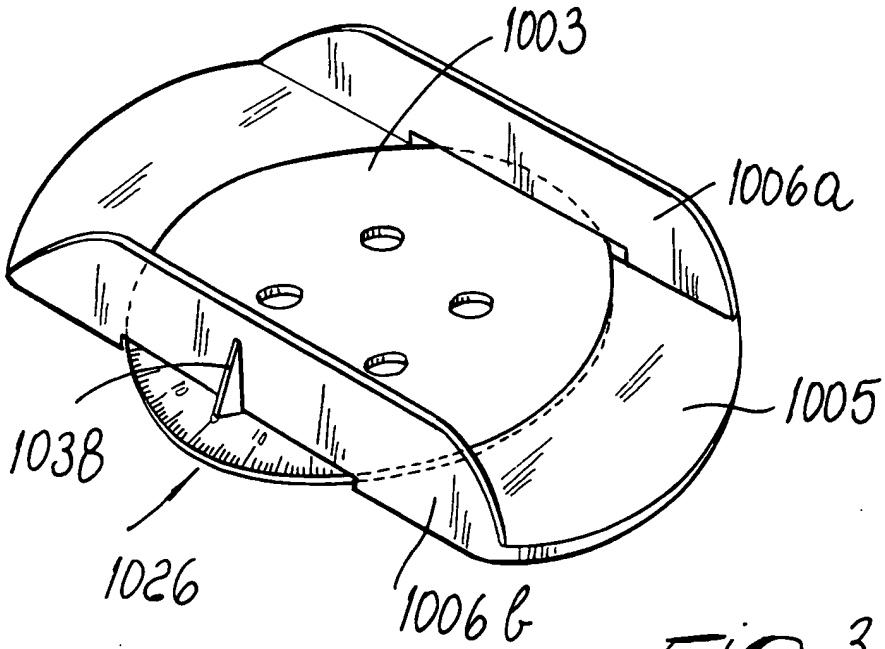

Fig. 32

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 11 2203

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X A	FR-A-2 702 388 (MICHEL) * page 3, paragraph 1; figures 1-10,14 *	1 3,4	A63C9/08
X A	FR-A-2 627 097 (DURET) * figures 2-8 *	1,2 3,4,9	
X A	EP-A-0 285 558 (NÄPFLIN) * column 3, paragraph 1; figure 3 *	1,2 9	
A	DE-U-94 06 441 (GRAF) * page 8, paragraph 4; figure 5 *	1,4,7,8	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

A63C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26 November 1996	Steegman, R

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
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P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
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